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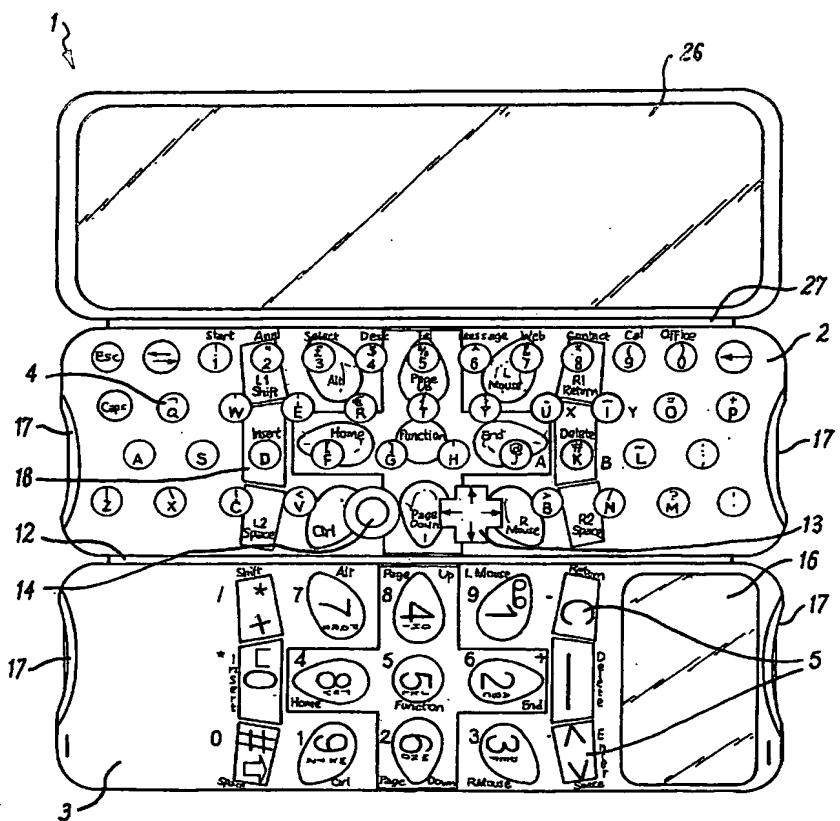
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[Continued on next page]

(54) Title: MINIATURISED KEYBOARD



(57) Abstract: A keyboard (1) that comprises for miniaturisation of the keyboard (1) while maintaining efficient use of the keyboard (1) by an operator is described. The keyboard (1) comprises a first keyboard section (2) that contains the character input keys (4) and a second independent keyboard section 3 that contains the usual command keys (5). The two keyboard sections are pivotally attached so that the keyboard (1) can be moved between an open desktop configuration and a closed, hand-held configuration. As a result the keyboard (1) is capable of being employed as a desktop keyboard, a hand-held keyboard. When configured as a hand-held keyboard the keyboard (1) may also be employed as a games controller, a mobile phone or as a remote control device.

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Published:

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- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

1 Miniatuerised Keyboard

2

3 The present invention relates to a keyboard. In
4 particular, the invention relates to a keyboard that
5 comprises a key layout that allows for miniaturisation
6 while maintaining efficient use by a keyboard operator.

7

8 Over recent years there has been steady progress made in
9 the art of miniaturising keyboards due to the continued
10 miniaturisation of electronic components. These
11 miniaturised keyboards find application in the fields of
12 portable computers, mobile phones and electronic games
13 controllers. Most of the keyboards for portable
14 computers are still based on the standard "QWERTY" key
15 layout wherein the letter keys are enclosed by number and
16 symbol keys across the top edge and command keys around
17 the remaining edges. Typically, these keyboards are
18 designed to be used on a desktop and so limit the true
19 portability of these devices. Those keyboards that are
20 designed to be hand held are typically limited to use
21 with only the thumbs of an operator.

22

1 The main restriction on the continued miniaturisation of
2 these keyboards is the fact that keyboard operator's
3 fingers can not themselves be miniaturised. Therefore,
4 although electronic components continue to get smaller
5 the advantage of this increased miniaturised can not be
6 fully exploited by the present keyboard designs. Present
7 keyboard designs are also the main limiting factor in the
8 continued miniaturisation of mobile phones.

9

10 Furthermore, the design of keyboards employed for
11 portable computers, mobile phones and electronic games
12 controllers have each evolved separately resulting in
13 their own data input and control devices that require
14 different operating skills by the user. Current attempts
15 to integrate one or more of these keyboard designs have
16 resulted in keyboards that are clumsy and so inefficient
17 for operators to use.

18

19 It is an object of an aspect of the present invention to
20 provide a keyboard design that provides good
21 miniaturisation capabilities while allowing for efficient
22 use by a keyboard operator.

23

24 A further object of an aspect of the present invention is
25 to provide a keyboard design that provides good
26 miniaturisation capabilities and so allows for the
27 integration of the functionality of a standard computer
28 keyboard, a mobile phone and an electronic games
29 controller.

30

31 According to a first aspect of the present invention
32 there is provided a keyboard for use by an operator
33 comprising a first keyboard section containing a

1 plurality of character input keys, a first edge that is
2 located adjacent to the operator during normal use of the
3 keyboard and a second keyboard section containing a
4 plurality of command input keys wherein the second
5 keyboard section is located between the first keyboard
6 section and the first edge and is displaced from the
7 first keyboard section.

8

9 Preferably the plurality of character input keys comprise
10 keys for inputting printable characters selected from the
11 group comprising alpha numeric, symbols and punctuation
12 characters.

13

14 Preferably the plurality of command input keys comprise
15 keys for inputting commands selected from the group
16 comprising tab, capitals lock, numbers lock, shift,
17 control, alt, back space, insert, delete, home, end, page
18 up, page down, mouse control, escape, and function keys.

19

20 Preferably the keyboard further comprises connection
21 means for connecting the keyboard to a remote computer
22 system. Optionally the connection means comprises a
23 signal transmitter.

24

25 Most preferably the first keyboard section and the second
26 keyboard section are pivotally attached so that the
27 second keyboard section can be moved from the displaced
28 position to a second position located below the first
29 keyboard section.

30

31 Optionally, when the second keyboard section is moved to
32 the second position the function of the command input
33 keys are remapped so as to maintain the relative position

1 of the function of the command input keys to that
2 provided in the displaced position.

3

4 Preferably the first keyboard section further comprises a
5 multidirectional key and a mouse stick and the command
6 input keys are mapped to provide a plurality of trigger
7 buttons so enabling the keyboard to be employed as a
8 games controller.

9

10 Preferably the first and second keyboard sections
11 comprise side cut recesses.

12

13 Preferably the first keyboard section comprises a
14 representation of the configuration of the function of
15 the command input keys when the second keyboard section
16 is located in the second position.

17

18 Optionally when the second keyboard section is moved to
19 the second position the first keyboard section is
20 deactivated.

21

22 Optionally when the second keyboard section is moved to
23 the second position the keyboard functions as a remote
24 control device. Alternatively the second keyboard
25 section comprises a mobile phone screen such that when
26 the second keyboard section is moved to the second
27 position the keyboard functions as a mobile phone.

28

29 Optionally the keyboard further comprises a main screen.

30

31 Preferably the main screen is pivotally attached to the
32 first keyboard section so that it moves between a first

1 position where the main screen can be viewed and a second
2 position where the main screen can not be viewed.

3

4 Most preferably when the main screen is the second
5 position it provides a physical barrier to the character
6 input keys.

7

8 Preferably the keyboard is made of a plastic material.

9

10 Preferably the character input keys and the command keys
11 comprise keys that are ergonomically optimised.

12

13 Aspects and advantages of the present invention will
14 become apparent upon reading the following detailed
15 description and upon reference to the following drawings
16 in which:

17

18 Figure 1 presents a schematic representation of a
19 keyboard in accordance with an aspect of the
20 present invention;

21

22 Figure 2 presents a schematic representation of an
23 operator's finger positions employed with the
24 keyboard of Figure 1;

25

26 Figure 3 presents a side elevation of the keyboard of
27 Figure 1 when arranged in a:

- 28 a) Open, desktop configuration;
- 29 b) Closed, hand-held configuration; and
- 30 c) Closed, hand-held configuration with a
31 main screen also in a closed position;

32

1 Figure 4 presents a schematic representation of an
2 operator's finger positions when the keyboard
3 is employed in the closed, hand-held
4 configuration of Figure 3(b);

5

6 Figure 5 presents a schematic representation of an
7 operator's finger positions when the keyboard
8 is employed in the closed, configuration of
9 Figure 3(b) as a games controller.

10

11 Referring to Figure 1 a schematic representation of a
12 keyboard 1 in accordance with an aspect of the present
13 invention is presented. The keyboard 1 can be seen to
14 comprise a first keyboard section 2 and a second keyboard
15 section 3 displaced from the first towards the normal
16 operating position of a keyboard user. A connection
17 means (not shown) allows the keyboard to be incorporated
18 directly with any computer system, as and when required.
19 The connection means can be in the form of hard wiring or
20 alternatively via remote access by incorporating a signal
21 transmitter (not shown) within the keyboard 1.

22

23 The first keyboard section 2 comprises character input
24 keys 4, namely letter, number and symbol keys arranged in
25 a standard "QWERTY" style layout. The second keyboard
26 section 3 comprises the majority of the usual command
27 input keys 5 found on a standard keyboard i.e. shift,
28 control, alt, delete, insert, home, end, page up, page
29 down, mouse control, and function keys.

30

31 Figure 2 presents a schematic representation of an
32 operator's finger positions when the keyboard 1 is
33 employed. As can be seen the first keyboard section 2 is

1 divided into regions for the operator's forefingers 6,
2 middle fingers 7, ring and small fingers 8 while the
3 second keyboard section 3 is divided into regions for use
4 by the thumbs of an operator. In particular, the left
5 thumb controls the keys within a left thumb region 9, the
6 right thumb controls the keys within a right thumb region
7 10 and either thumb controls the keys within the central
8 thumb region 11.

9

10 The development of the second keyboard section 3 allows
11 for the keyboard 1 to be miniaturised while maintaining
12 efficiency of use by an operator when compared to those
13 keyboard designs already known to those skilled in the
14 art. In particular, the efficiency of use of the
15 keyboard is maintained by the location of all of the
16 command keys 5 within an area that can be easily accessed
17 by the thumbs of the operator while the character input
18 keys 4 still allow for eight finger touch typing.

19

20 It will be obvious to those skilled in the art that
21 alternative key arrangements to the "QWERTY" style
22 arrangement can also be employed within the first
23 keyboard section 2. For example in an alternative
24 embodiment (not shown) a "DVORAK" key arrangement is
25 employed within the first keyboard section 2.

26

27 The design of the keyboard 1 can be further exploited so
28 as to further increase the miniaturisation of the device
29 and to allow increased functionality to be achieved by an
30 operator. Referring to Figure 1 the keyboard 1 can be
31 seen to further comprise a first hinge 12 located between
32 the first 2 and second keyboard sections 3.

33

1 The first keyboard section can also be seen to further
2 comprise a multidirectional key 13, a mouse stick 14 and
3 four games control keys 15. The games control keys 15
4 are simply letter keys 4 produced in different colours so
5 as to allow them to be easily identified from the other
6 letter keys 4 located on the first keyboard section 2.

7

8 Furthermore, the second keyboard sections 3 can be seen
9 to further comprise a mobile phone screen 16. The
10 command keys 5 of the second keyboard sections 3 can be
11 mapped so as to function as a standard mobile phone
12 keyboard, as a remote control device, or as the trigger
13 buttons for a games controller, as explained in detail
14 below.

15

16 From an analysis of Figure 3 the integrated nature of the
17 keyboard 1 becomes readily apparent. Figure 3(a)
18 presents a side elevation of the keyboard 1 of Figure 1
19 in a fully expanded, desktop configuration.

20

21 Moving to Figure 3(b) the second keyboard section 3 has
22 been pivoted about the first hinge 12 so that the second
23 keyboard section 3 now locates below the first keyboard
24 section 2. In this orientation the keys 4, 13, 14 and 5
25 of both the first 2 and second keyboard sections 3 remain
26 accessible to the operator. This configuration is
27 referred to as the closed, hand-held configuration. In
28 the closed, hand-held configuration the keyboard 1 is
29 specifically designed to be held and operated by both
30 hands, as detailed below, thus providing true portability
31 during use, for example when employed on trains or
32 planes. Indeed to aid in this process side cut recesses
33 17 are located in the first 2 and second keyboard

1 sections 3 to aid gripping by the knuckles of the
2 forefingers.

3

4 It should also be noted that when the second keyboard
5 section 3 is located below the first keyboard section 2
6 the functional layout of the command keys 5 is remapped.
7 This is carried out in order to maintain the position of
8 the command keys 5, and the relationship between them,
9 with that provided when the keyboard 1 is in the desktop
10 configuration. For example the "9" key on the second
11 keyboard section 3 is ascribed the "Ctrl" function in the
12 expanded, desktop configuration. However, in the closed,
13 hand-held configuration the "Ctrl" function moves to the
14 "7" key which now occupies that position. To aid
15 location by an operator of the keyboard 2 in this
16 configuration the layout of the command keys 5 on the
17 second keyboard section 3 is reproduced in shadow form 18
18 on the first keyboard section 2.

19

20 Figure 4 presents a schematic representation of an
21 operator's finger positions when the keyboard 1 is
22 employed in the closed, hand-held configuration of Figure
23 3(b). As can be seen the operator's thumbs are employed
24 to control the character input keys 4 on the first
25 keyboard section 2. In particular the left thumb
26 operates the keys within a left thumb region of the first
27 keyboard section 19 while the right thumb operates the
28 keys located within a right thumb region 20. Either
29 thumb is then available to operate the keys within a
30 middle region of the first keyboard section 21. The
31 operator's forefingers, middle fingers, ring and/or small
32 fingers then control the command keys 5 located within a

1 front region 22, a middle region 23 and a back region of
2 the second keyboard section 24, respectively.

3

4 The keyboard 1 is capable of operating in different
5 functional modes when in the closed, hand-held
6 configuration. A "function" command key 5 is employed to
7 toggle through the alternative functional modes.

8

9 A first functional mode corresponds to the keyboard 1
10 being employed as a games controller. Referring to
11 Figure 5 a schematic representation of an operator's
12 finger positions when the keyboard 1 is employed in the
13 closed configuration of Figure 3(b) as a games controller
14 is presented. In this mode the mouse stick 14 acts as a
15 joystick, which together with the multidirectional key 13
16 and the game control keys 15 are operated by the thumbs
17 of an operator. For this function the command keys 5 are
18 mapped so as to provide trigger buttons 25 for the games
19 controller. The trigger buttons 25 (Left 1 (L1), Left 2
20 (L2), Right 1 (R1) and Right 2 (R2)) are activated by an
21 operator by the use of their forefingers and the ring
22 fingers accessing the second keyboard section 3, as
23 appropriate. As a result when employed as a games
24 controller the keyboard 1 allows for multi-finger play by
25 an operator.

26

27 The second and third functional modes can be considered
28 as single hand modes of operation and correspond to the
29 keyboard 1 functioning as a mobile phone and a remote
30 control device, respectively. When in these modes of
31 operation the first keyboard section 2 is redundant and
32 so rendered inactive. In the mobile phone mode the
33 second keyboard section 3 is mapped so that the keyboard

1 1 replicates the function of a mobile phone keyboard.
2 Similarly, in the remote control device mode the second
3 keyboard section 3 is mapped so that the keyboard 1
4 operates as a remote control keyboard for the remote
5 control of a domestic appliance e.g. television, stereos,
6 video player, DVD player etc.

7

8 Figure 1 and 3 presents a further alternative embodiment
9 of the keyboard 1 where it comprises a main screen 26.
10 The main screen 26 is attached to the first keyboard
11 section 2 by a second hinge 27. In this embodiment the
12 main screen 26 pivots about the second hinge 27 so that
13 it moves between a first position, where the main screen
14 26 can be easily viewed (see Figures 1, 3(a) and 3(b))
15 and a second position where the screen 26 can not be
16 viewed, Figure 3(c). In particular when located in the
17 second position the rear area of the screen 26 section
18 provides a physical barrier for an operator to the keys
19 4, 13 and 14 of the first keyboard section 2.
20 Furthermore, when moved to the closed position the main
21 screen can be used to deactivate the first keyboard
22 section. At this stage only the single hand modes of
23 operation, namely the mobile phone mode and the remote
24 control device mode are available for selection.

25

26 The keyboard 1 is made of a plastic material so as to
27 allow for ease of manufacture and the ability to utilise
28 colours to facilitate identification of the keys 4, 13,
29 14 and 5 and their function. The keys 4, 13, 14 and 5
30 are also shaped to optimise ergonomics in terms of the
31 fingers used to operate them. For example "petal" shaped
32 command keys 5 are employed on the second keyboard
33 section 3. Furthermore, the casing of the keyboard 1 can

1 further comprise protrusions (not shown) located around
2 the keys 4, 13, 14 and 5 so as to aid the location of an
3 operator's finger to the keys 4, 13, 14 and 5.

4

5 Aspects of the present invention have a number of
6 advantages over those keyboards described in the prior
7 art. In the first instance the two keyboard section
8 design provides a means for miniaturising keyboards
9 whilst still allowing for an acceptable degree of
10 efficiency of use by an operator i.e. still allowing for
11 eight finger touch typing. This is achieved because the
12 keyboard design moves the constraint on miniaturisation
13 from being one of human anatomy to be one of hardware
14 development.

15

16 Additional miniaturisation is also achieved through the
17 introduction of hinges that allow the component sections
18 to pivot relative to each other. These features provide
19 the additional advantage that they allow for the keyboard
20 to be configured for use as a desktop keyboard or as a
21 hand held keyboard. The hand-held configuration is
22 designed specifically to be held, and operated, by both
23 hands so allowing for true portability of the keyboard.
24 In the hand-held configuration the keyboard can be
25 selected to operate as a games controller, as a mobile
26 phone or as a remote control device.

27

28 It should be noted that all of the available keyboard
29 modes can be obtained within a platform that is sized
30 with a standard mobile phone. By allowing the majority
31 of the keys to provide multiple functions there is a
32 significant reduction in the overall number of keys
33 required by the keyboard.

1
2 The foregoing description of the invention has been
3 presented for purposes of illustration and description
4 and is not intended to be exhaustive or to limit the
5 invention to the precise form disclosed. The described
6 embodiments were chosen and described in order to best
7 explain the principles of the invention and its practical
8 application to thereby enable others skilled in the art
9 to best utilise the invention in various embodiments and
10 with various modifications as are suited to the
11 particular use contemplated. Therefore, further
12 modifications or improvements may be incorporated without
13 departing from the scope of the invention as defined by
14 the appended claims.

1 **CLAIMS**

2

3 1) A keyboard (1) for use by an operator comprising a
4 first keyboard section (2) containing a plurality of
5 character input keys (4), a first edge that is
6 located adjacent to the operator during normal use of
7 the keyboard and a second keyboard section (3)
8 containing a plurality of command input keys (5)
9 wherein the second keyboard section (3) is located
10 between the first keyboard section (2) and the first
11 edge and is displaced from the first keyboard section
12 (2).

13

14 2) A keyboard (1) as claimed in Claim 1 wherein the
15 plurality of character input keys (4) comprise keys
16 for inputting printable characters selected from the
17 group comprising alpha numeric, symbols and
18 punctuation characters.

19

20 3) A keyboard (1) as claimed in Claim 1 or Claim 2
21 wherein the plurality of command input keys (5)
22 comprise keys for inputting commands selected from
23 the group comprising tab, capitals lock, numbers
24 lock, shift, control, alt, back space, insert,
25 delete, home, end, page up, page down, mouse control,
26 escape, and function keys.

27

28 4) A keyboard (1) as claimed in any of the preceding
29 Claims wherein the keyboard (1) further comprises
30 connection means for connecting the keyboard (1) to a
31 remote computer system.

32

- 1 5) A keyboard (1) as claimed in Claim 4 wherein the
2 connection means comprises a signal transmitter.
3
- 4 6) A keyboard (1) as claimed in any of the preceding
5 Claims wherein the first keyboard section (2) and the
6 second keyboard section (3) are pivotally attached so
7 that the second keyboard section (3) can be moved
8 from the displaced position to a second position
9 located below the first keyboard section (2).
10
- 11 7) A keyboard (1) as claimed in Claim 6 wherein when the
12 second keyboard section (3) is moved to the second
13 position the function of the command input keys (5)
14 are remapped so as to maintain the relative position
15 of the function of the command input keys (5) to that
16 provided in the displaced position.
17
- 18 8) A keyboard (1) as claimed in Claim 6 wherein the
19 first keyboard section further comprises a
20 multidirectional key and a mouse stick and the
21 command input keys are mapped to provide a plurality
22 of trigger buttons so enabling the keyboard to be
23 employed as a games controller.
24
- 25 9) A keyboard (1) as claimed in any of the preceding
26 Claims wherein the first (2) and second keyboard
27 sections (3) comprise side cut recesses (17).
28
- 29 10) A keyboard (1) as claimed in Claims 6 to 9 wherein
30 the first keyboard section (2) comprises a
31 representation (18) of the configuration of the
32 function of the command input keys (5) when the

1 second keyboard section (3) is located in the second
2 position.

3

4 11) A keyboard (1) as claimed in Claims 6 to 10 wherein
5 when the second keyboard section (3) is moved to the
6 second position the first keyboard section (2) is
7 deactivated.

8

9 12) A keyboard (1) as claimed in Claims 6 to 11 wherein
10 the second keyboard section (3) functions as a remote
11 control device.

12

13 13) A keyboard (1) as claimed in Claims 6 to 11 wherein
14 the second keyboard section (3) comprises a mobile
15 phone screen such that the second keyboard section
16 (3) functions as a mobile phone.

17

18 14) A keyboard (1) as claimed in any of the preceding
19 Claims wherein the keyboard (1) further comprises a
20 main screen (26).

21

22 15) A keyboard (1) as claimed in Claim 14 wherein the
23 main screen (26) is pivotally attached to the first
24 keyboard section (2) so that it moves between a first
25 position where the main screen (26) can be viewed and
26 a second position where the main screen (26) can not
be viewed.

28

29 16) A keyboard (1) as claimed in Claim 15 wherein when
30 the main screen (26) is the second position it
31 provides a physical barrier to the character input
32 keys (4).

33

1 17) A keyboard (1) as claimed in any of the preceding
2 Claims wherein the keyboard (1) is made of a plastic
3 material.

4

5 18) A keyboard (1) as claimed in any of the preceding
6 Claims wherein the character input keys (4) and the
7 command keys (5) comprise keys that are ergonomically
8 optimised.

9

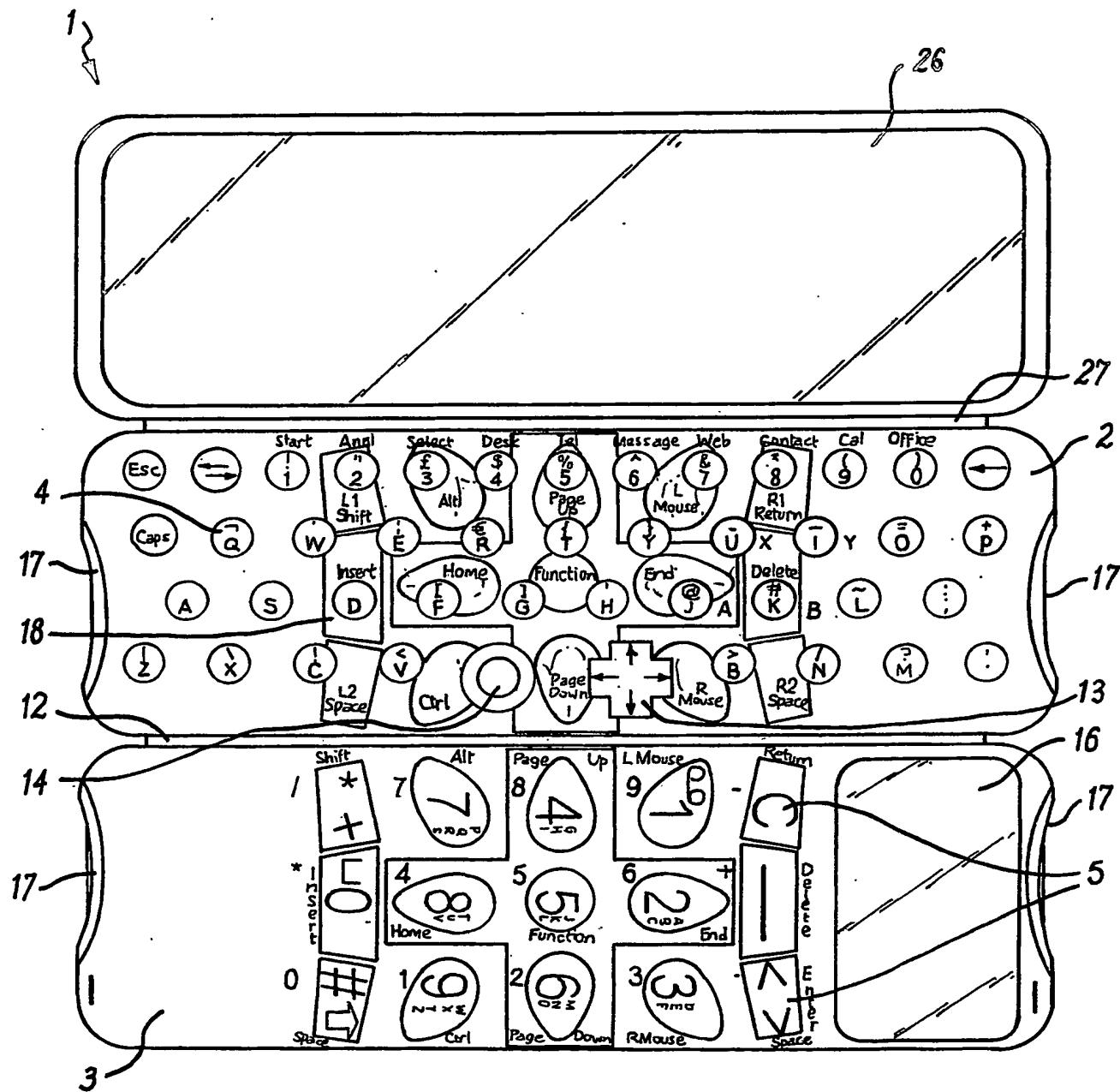
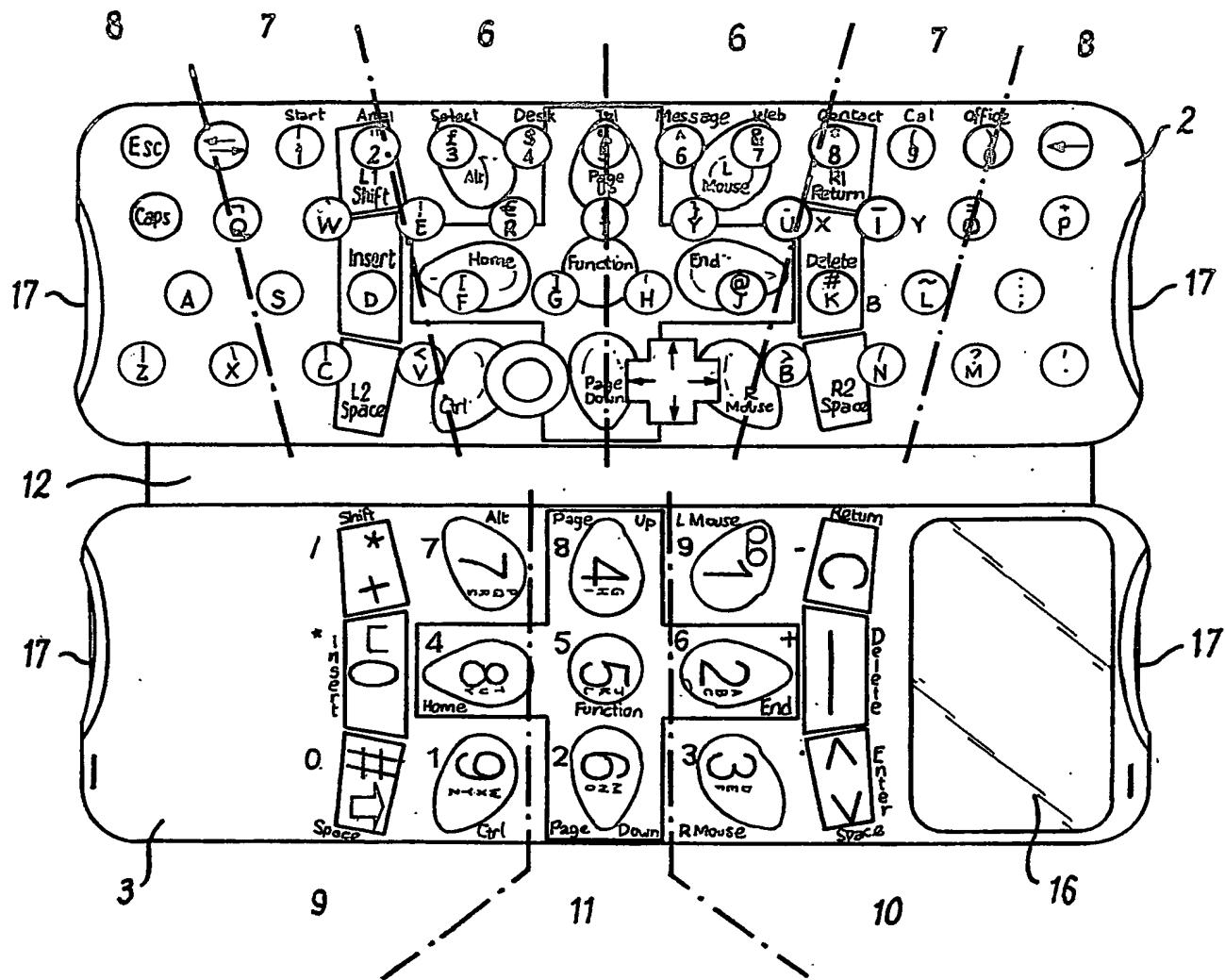
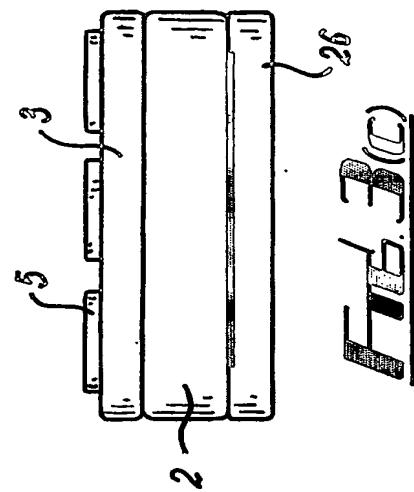
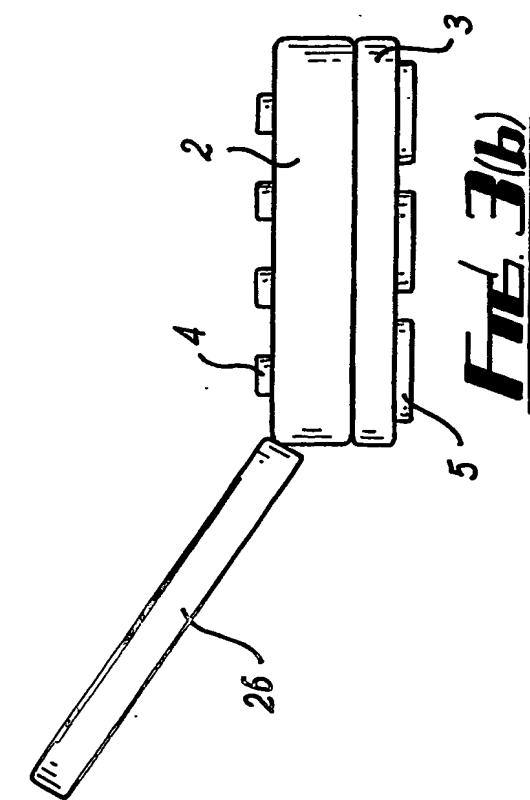
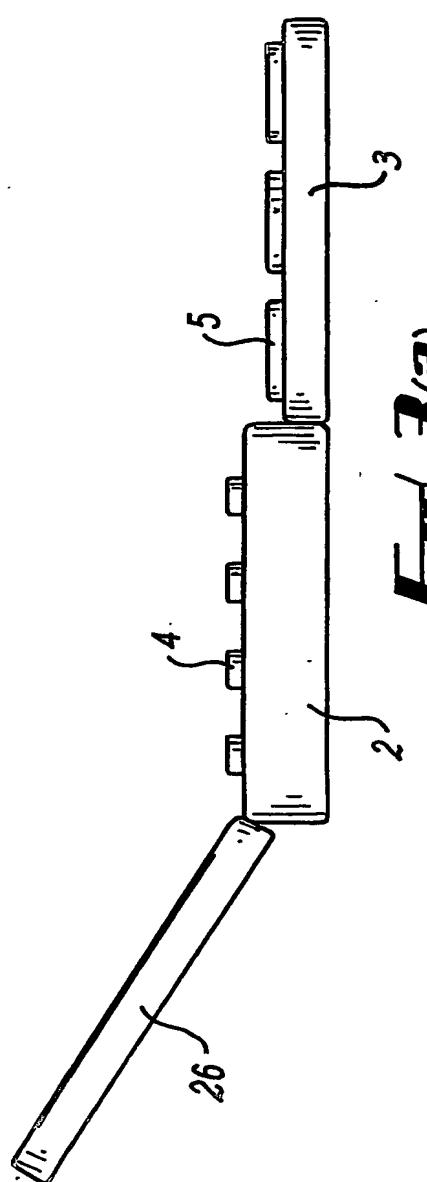


FIG. 1

**FIG. 2**



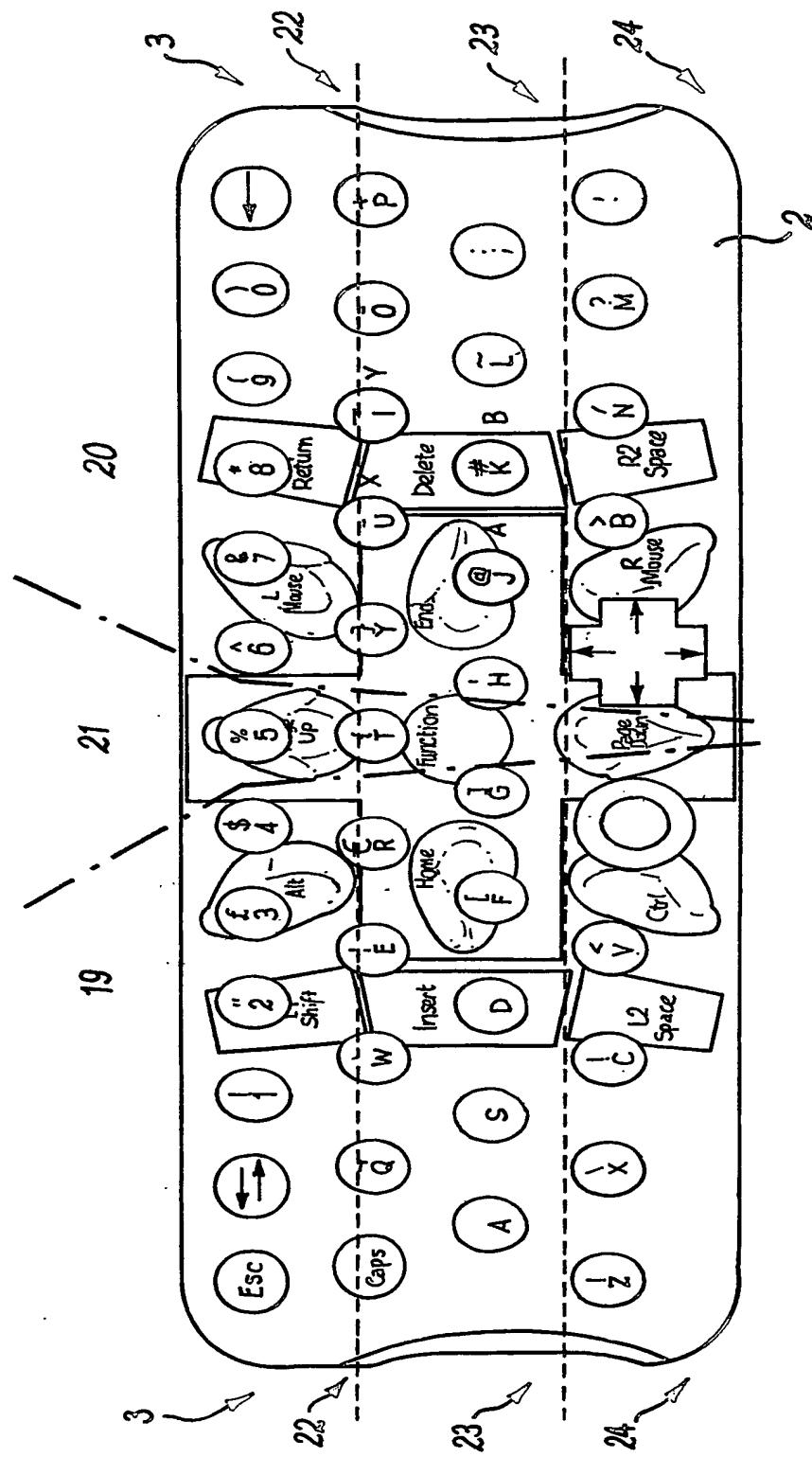


FIG. 4

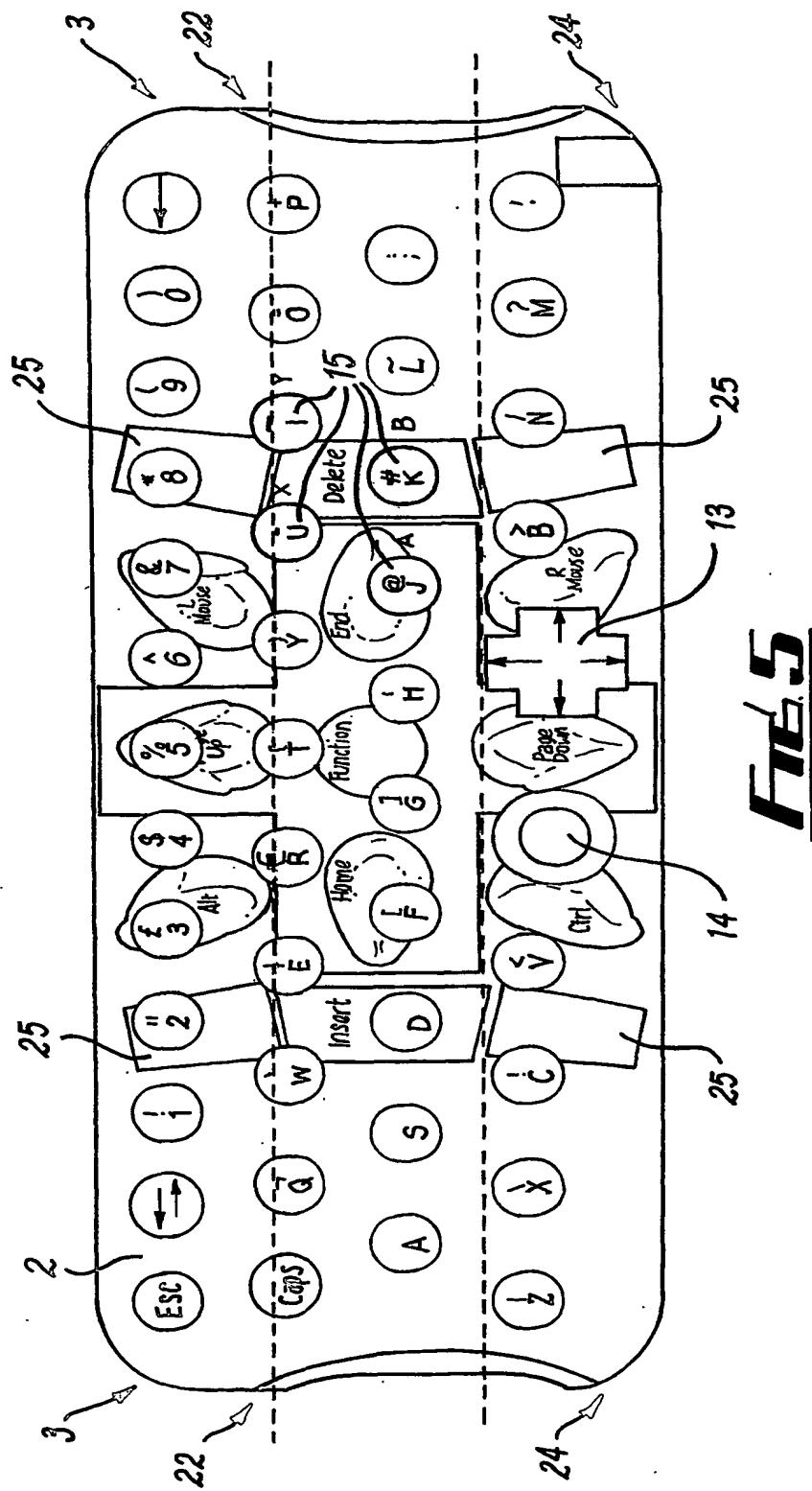


FIG. 5

INTERNATIONAL SEARCH REPORT

Ir Application No
PCT/EP2004/001138

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 7 G06F1/16 G06F3/02 H04M1/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
 IPC 7 G06F H04M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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X	US 2003/020692 A1 (HOLMES JOHN A ET AL) 30 January 2003 (2003-01-30)	1-13,17,
Y	paragraphs '0030! – '0032! – paragraphs '0058! – '0063!; figures 2,14-16	18 14-16
Y	EP 0 776 140 A (NOKIA MOBILE PHONES LTD) 28 May 1997 (1997-05-28)	14-16
A	column 2, line 56 – column 3, line 23 column 9, line 21 – line 40; figure 5	13
X	US 6 297 752 B1 (NI XUAN) 2 October 2001 (2001-10-02)	1
A	the whole document	10
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INTERNATIONAL SEARCH REPORT

In Application No
PCT/GB2004/001138

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